

PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products

DECEMBER, 1926

BUREAU OF STANDARDS

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LISBURY



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ORANGE, N. J.



December, 1926

425



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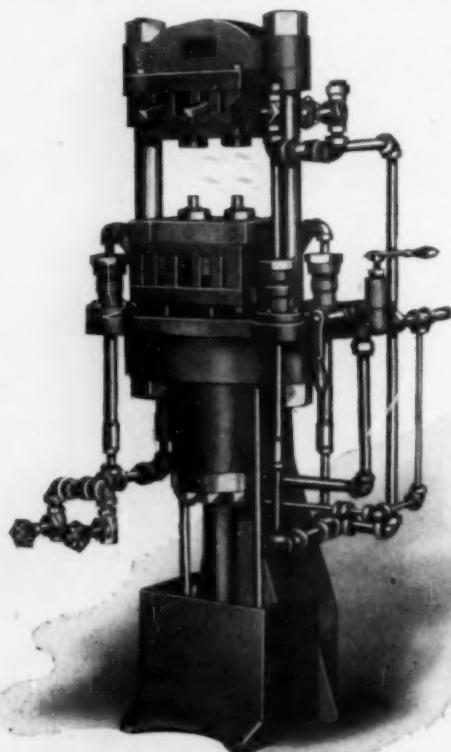
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This is not a single purpose machine but can be used to mold any articles within its range, or by installing steam plates used as a plain press.

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246 N. 10TH ST., NEWARK, N. J.

IN looking over the advance proofs of this number of PLASTICS it struck us that the informative data in one issue was extremely diverse and educational. As an indication of this we thought it would be interesting to make a series of questions that would stimulate your interest. See if you can answer the following:

Give 100 uses of pyroxylin plastics.

What is called the "semi-positive" method of molding?

What woods can be used, and why, for wood flour products?

What is the name of the new phenol-resin and what are its properties?

Where was the invention and first production of casein solids? Describe the new process of automatic production of eyeglass rims.

All of these subjects are answered and written about in this issue. As you go through the publication you will find that extensive information about many additional subjects are given you. Every foreman, executive, and all up and coming men in this business can profitably study the pages of this magazine. If you know any one who should get PLASTICS, we will be glad to have their name so as to send them a complimentary copy.

ADVERTISERS in PLASTICS say that this magazine is a good advertising medium. We have tried to make it the super-medium between seller and buyer and of course in many cases have gone beyond the ordinary in acting as an intermediary.

A paragraph from a letter which has just come in from an advertiser in relation to this is self-explanatory. Here it is:

"We might say that we appreciate very much your efforts on our behalf. Your idea of service to your customers is certainly in advance of anything we have run across in our dealings with other trade journals."

PLASTICS not only gets results but in many other ways contributes to the profit of its advertisers.

The Publishers.

PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 2

December, 1926

No. 12

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Offices: 471 4th Ave., New York. Telephone Ashland 0568

360 N. Michigan Ave. Chicago, Ill.

SYLVAN HOFFMAN, Man. Editor.

Issued Monthly

35 cents a copy

ALAN COHEN, Adv. Director

Subscription Price

U. S. \$3.00, Foreign \$4.00 Per Year

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PLASTICS

A periodical devoted to the manufacture
and use of plastic and composition products

Vol. 2

DECEMBER, 1926

No. 12

Durability--the Feature of Pen Advertising

The Parker Pen Company, thru a sensational series of tests, successfully advertises the unbreakability of their pyroxylin pen barrels

By William C. Segal

A SPLENDIDLY conceived national advertising campaign which stirred up unusual interest among fabricators of pyroxylin and casein plastics materials was recently launched by The Parker Pen Company of Janesville, Wisconsin.

Using the Saturday Evening Post, American Magazine, Literary Digest, Liberty, Life, National Geographic and other publications, including 400 college papers and 200 metropoli-

tan newspapers, a most dramatic series of advertisements was published.

The unbreakability of the Parker Pen was the keynote of the campaign. Results of tests which showed the durability and tough endurance of the Permanite pen barrel were vividly reported. Certainly, these tests provided material for an interesting and stirring a fountain pen campaign as has ever been featured.

WHEN one looks back to the days when practically every fountain pen featured a hard rubber casing, it is amazing to note the overwhelming preponderance of pyroxylin and casein plastic barrels now in use. The past few years have witnessed a wholesale veering away from the archaic rubber barrels which characterized the fountain pens of by-gone years. Offering a beauty and versatility



Here are three ads which so graphically described the tests which Parker Pens successfully passed. These ads appeared in various issues of over 600 publications.

which could not be achieved through rubber, it was not strange that the fountain pen manufacturer soon favored the newer materials.

NEITHER was it strange that the Parker Company, having been remarkably successful in effectively advertising the 25 year pen point and general beauty of the writing instrument, should figure that the opportune time for impressing the public with the Permanite barrel had arrived.

From the consumer's viewpoint, the two main features of any fountain pen are the actual pen point—assurance of writing performance, and the outward construction which makes for beauty of appearance.

Huge sums of money had been invested in advertising the fine balance, the beauty, the writing capacity and other features of the pen, and undoubtedly the Parker Pen is well established in the public consciousness as a admirably possessing these characteristics. Through consistently brilliant advertising of these features much of the success of the Parker Pen was built. Comparatively little attention had been paid to the unbreakability of the barrel; beauty rather than durability had been stressed.

WITH many fountain pen advertisers playing up the fact that their pens were non-breakable, the time was propitious for the Parker advertising staff to emphatically stress the absolute unbreakability of their product.

It remained for the series of ads first mentioned to bring about a genuine confidence and public faith in the durability of the Parker Permanite barrel.

The daring conception of the test idea and its startling presentation were certain to attract public attention and build up

buyer confidence. Advertising of such boldness and evident sincerity could not help but succeed.

The first test coached in terse, sensational style—almost bordering on the melodramatic—gave the details and results of

Dropped 3,000 feet!
For a year we kept secret the fact that Parker Duofold is made of "Permanite" until a series of grueling tests proved it will not break.

Pens and Pencils

The ad that summed up the test campaign. Permanite barrels—their remarkable resistance and reasons for their unbreakability comprise the major portion of the copy.

a test where the Parker was dropped from an aeroplane 3,000 feet in the air and picked up unbroken. The second showed the amazing durability of the Permanite barrel by a description, that was actually thrilling, of how on being dropped from the 26th floor of a hotel onto the pavement and picked up—the Parker was practically unscratched. The third, following the same trend and presentation, told the story of how the Parker withstood the gruelling test of having three 11-ton busses roll over it.

SUCH advertising brings home in jolting, positive fashion, the durability of the Permanite material used in Parker Pens.

Apart from the dramatized feature of copy, the careful reader is given an opportunity to reflect on the following note

which was placed in a corner of the second ad:

"Permanite"—the Non-Breakable Material

All Parker Pens and Pencils are now made of a new lustrous light-weight, non-breakable material called "Permanite." Do not class it with other non-breakable products. For "Permanite" is given a second cure in Parker's own kilns and hence does not shrink, crack or fade.

When we must double-cure our own pens and pencils, how can you expect many years of hard use from single-cured products? Guarantees prove nothing. Only such tests as the Parker Duofold has successfully withstood are conclusive proof that a pen or pencil barrel will last practically forever.

TO many advertising men the campaign brought back a reminiscent flavor of the "Proved Durability" campaign which characterized Corona typewriting advertising of recent years.

But whereas the Corona ads were presented and written around the unsolicited letters of users—testimonials to the hardiness of the Corona typewriter—the advertising of the Parker Company was in the form of direct reports on specific tests to which the Company's pens were subjected.

From the viewpoint of an observer interested in the industry covered by PLASTICS magazine, the Parker advertising is both a recognition and a triumph for the durability of various plastics as a material for use in the fabrication of modern fountain pens. The entire industry stands ready to applaud the sponsors of a campaign which gives so great a share of attention to a deservedly important feature of the modern fountain pen.

Blood as a Base for Plastics

**Material now wasted can be converted
into valuable products by simple process**

By Leon Bouvier

From Revue gen. matières Plastiques 1926, 2, 203

NOT so many years ago the animal blood produced by the abattoirs was practically a waste product. That which was not made into sausage or worked up into fertilizer, was thrown into the sewer and irretrievably lost. This represented a large economic waste, as blood, due to its high albumen content is equal to meat in nutrient value.

During the European war a considerable industry in dried blood sprang up (especially in Germany,) primarily for food stuffs, but as conditions became more nearly normal this dried blood became available for industrial uses.

Methods for the drying and other converting processes of blood have recently been developed to a high state of perfection.

As blood is one of the unavoidable products from the slaughter of animals for food, the supply is apparently constant. For example, a full sized steer will furnish about 18 liters (a little over 18 quarts) of fresh blood from which 4 to 5 liters of serum, containing from 7 to 8% of blood albumen, can be recovered. An analysis of blood gives the following figures:

Total solids	19 to 20%
Albumen	16 to 17%
Water	81 to 80%

The serum itself contains:

Total solids	8 to 9%
Albumen	7 to 8%
Water	92 to 91%

The fibrin, found in the dried substance, is present to the extent of 0.2 to 0.7%. This

material causes the well-known phenomenon of coagulation. This usually takes place from 20 to 24 hours after the blood has been drawn and effects the separation of blood into two layers one layer being clear light and light yellow, called the serum, and containing the al-

ways prevent coagulation. Usually a large amount of hemoglobin passes into the serum so that the latter will not be light colored. Beating will generally cause a loss of from 0.2 to 0.7% of albumen.

Under the influence of heat, both fresh as well as defibrinated blood will coagulate and albumen will be precipitated in an insoluble form together with the blood-corpuscles.

Blood Powder

Blood is never dried while fresh, only defibrinated blood being suitable for this purpose. The drying can be carried out in quite a number of different ways, one of the oldest and simplest being to simply evaporate down to about one-half the original volume, when the precipitated material is further dried to about 20% moisture content by pressure. Drying is finally accomplished in ordinary driers.

Due to the peculiar nature of blood, such a method does not, however, give very good results. The product is black and shiny. 100 liters of blood furnish about 14 kilograms of total solids. The material is finally dried and, if desired, sifted.

More modern methods, which allow of the recovery of blood in the dry condition, but still again soluble in water, have been worked out abroad and are carried out in apparatus patented by Meister (German Patent 254,992), by Herring and also by Krause (German Pat. 297,388). The latter method consists essentially in spraying the blood

In Europe, blood plastics are by no means a novelty, and it is believed that when the innocuous nature of the finished products are once understood, that they will be equally popular in America.

Using a technique differing but little from that used in making casein plastics, it might pay manufacturers of the latter to experiment with dried blood.

bumen, the salts, fats, sugar urea and traces of other materials in solution; while the lower layer forms a clot and consists mainly of the corpuscles of the blood (hemoglobin and hematin) as well as the fibrin, in an insoluble condition.

To avoid coagulation, salts such as sodium chloride, magnesium sulfate, sodium fluoride or oxalic acid are added to fresh blood. A similar result can be secured by "beating" the blood. The latter operation will result in a separation of the fibrin which is the cause of coagulation. However, beating will not

by means of a very rapidly revolving disc into a chamber transversed by a current of warm air. Details of the operation, as well as illustrations of the apparatus are to be found, in the original article.

When dried by this method, a very finely divided powder results. This is soluble in water to a solution which has all the characteristics of fresh blood or defibrinated blood, depending upon which is used. The drying of undefibrinated blood is only possible by this type of drying operation.

The article also describes, in considerable detail, the manufacture of blood serum albumen, this product being employed chiefly in pharmacy; as a substitute for egg albumen in photography and in the textile industries. Methods have also been perfected for the separate recovery of fibrin.

Plastic Materials From Blood

Prior to the war dried blood was hardly ever used for the manufacture of plastics, but since about 1919 this industry has assumed considerable proportions, especially in Germany. The product is being used as a substitute for other plastics, and especially in place of casein solids and vegetable ivory. At the present time the button industry consumes by far the largest part of the output.

Apparently the manufacture of plastics from dried blood has a promising future. Thus far factories for its manufacture have been erected in Germany, Checho-Slovakia and in Denmark.

The author then deplores the fact that the manufacture of this product has not made the advances that it should have in France, and that some plants that had started had given it up again. He blames the manufacturers for not availing themselves of the services of trained chemists, a point which was also mentioned by a German writer several years ago. He states that the outlook is excellent, and that the plants in Denmark and

in Checho-Slovakia are incapable of filling the orders that pour in upon them.

In commercial practice, seven liters of blood furnish one kilogram (2.2 lbs.) of dry material. All of the three main constituents of blood, albumen, hemoglobin and fibrin, appear to be essential for the formation of a suitable plastic material. Blood which has not been coagulated previously to drying lends itself more readily to the admixture of fillers than does coagulated blood. The quality of the blood also is quite important, that of veal being best. Regular abattoir blood, especially such as can be produced by the modern slaughter-houses of the United States, lends itself to the manufacture of plastics. If proper precautions are taken to keep it clean and to convey it at once to suitable tanks containing chemicals which retard or prevent coagulation, and if the drying of the blood is carried out at the place where it is collected, so as to avoid the necessity for expensive transportation, a good industry could be built up. A

process such as that of Krause would give the best promise of commercially valuable results.

Articles made from completely dehydrated blood, are capable of being used as substitutes for casein plastics and vegetable ivory. Whilst casein stands mixing with considerable amount of fillers, this is true to only a limited extent with the powdered blood plastics, and it is much more difficult to make a uniform blend. This is a problem which must still be worked out, although the writer states that he has seen some objects made by the firm of Winter & Slamberg of Roskilde, in Denmark, which were remarkably fine.

The chemical nature of the blood albumen is quite similar to that of the casein used in making plastic articles.

Both are albumenoid, nitrogenous substances, induratable by means of aldehydes such as formaldehyde and hexamethylenetetramine.

The manufacture of the objects will be described in greater detail in a future issue.

Bakelite Used in Automatic Gasolene Gauge

Molded Bakelite which has withstood a 500 volt A. C. test by the Underwriters' Laboratories at Chicago is being used in a new automatic fuel gauge for automobiles.

This gauge, consisting of a special gasoline float connected with the ignition system, is so arranged that it shows a light on the automobile dashboard when the gasoline level has reached two and one-half gallons. It goes out again when the fuel supply has been replenished. The vital part of the control mechanism is a disc of Bakelite molded, one and one-quarter inches in diameter, in which is solidly embedded a series of accurately spaced metal

contacts. These contact points control the dial lever on the dashboard gauge, and automatically switch on a light when the fuel supply runs low. A special ignition switch prevents the light from operating except while the car is actually in action.

Besides the insulation test, the Bakelite parts used in this device have also been subjected to a test of 600 vibrations per minute for eight hours, in order to insure ability to withstand the strain of daily service on the road.

Damsel Electric Gauge Company, Columbus, Ohio, are the manufacturers.

Production Methods in Molding

II. Details of manufacture of radio parts are described and illustrated

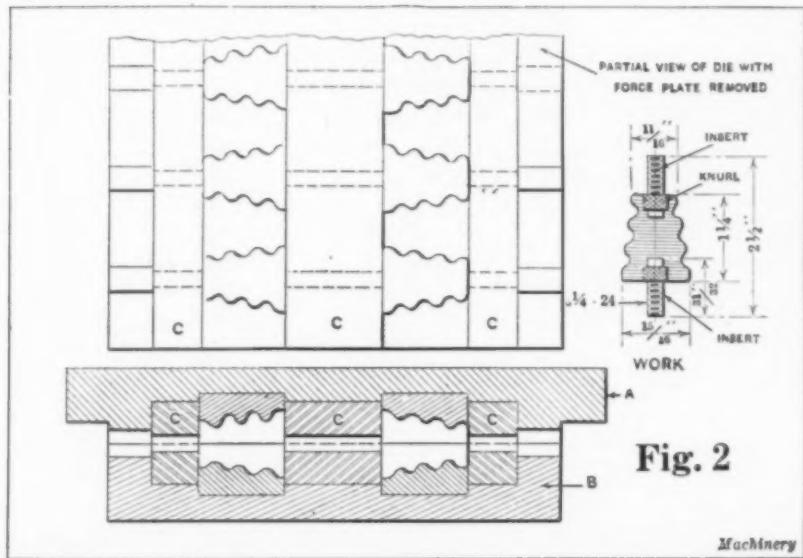
By Fred R. Daniels

This is the final installment of this instructive article on molding various radio parts. The first part appeared in PLASTICS for November, 1926, p. 385.

the view of the work, it will be seen that there are two of these inserts. They are made of brass, have a coarse knurled head and are threaded. The shoulder of the knurled head

serves to locate the inserts in the bars and they are slipped into the holes before the bars are put into the die. As soon as the operator has set the inserts into the three bars, pieces of sheet redmanol which previously were weighed to obtain a close approximation of the mass required and which have been warmed to a plastic state during the preparation of the die, are broken into small pieces which are tucked under the knurled heads of the inserts that project into the cavities in the base plate.

Fig. 3 shows the preparation of this die, after one row of cavities has been filled. The remaining space between the bars is piled high with the plastic material and then the die is closed by means of the force plate in which there are channels to receive the upper part of the insert-carrying bars C Fig. 2. This illustration Fig. 3 shows



Mold for making variable condenser insulators.

The next example of molding work is that of a variable condenser insulator, this part being made of sheet Redmanol in what might be termed semi-positive dies. A sectional view of this insulator, which is made for the Wireless Specialty Apparatus Co., Boston, Mass., is shown in Fig. 2, also a sectional view of the dies and a partial plan view with the force plate A removed.

The baseplate B contains three channels in which bars C are located by dowel-pins. There are holes spaced in these bars for the accommodation of the inserts which are molded into the insulators. Referring to



Fig. 3. Preparation of mold of Fig. 2

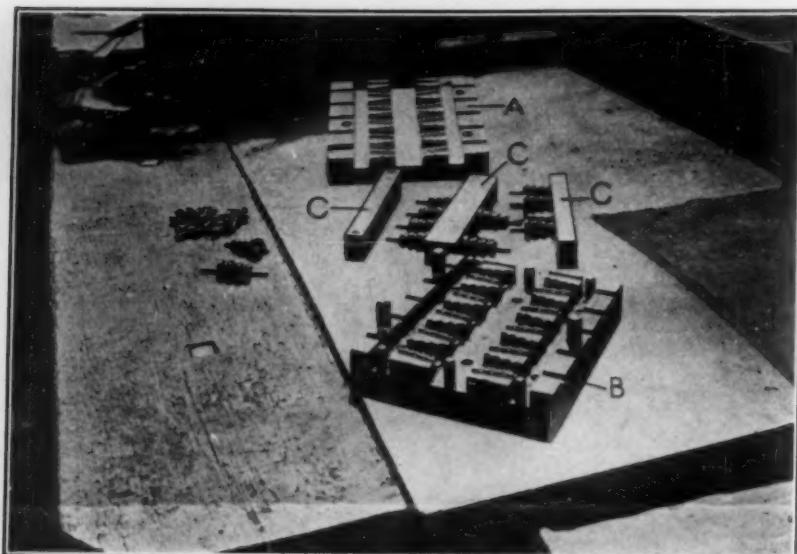


Fig. 4. Showing molds open, work partly removed.

a number of the pieces of Redmanol on a cloth, being warmed on the heated plate or work-bench and gives an idea of the die required for the production of this particular insulator. The pieces of sheet stock are about $2\frac{1}{2}$ inches square. The press shown in the foreground is the hot-press and the other is the one in which the dies are cooled by circulating water upon removal from the steam-heated press. The difficulty of providing overflow channels in the dies for this part accounts for the fact that although sheet stock is used, it must be nearly a positive mold. The only escapement for the material that is possible is at the parting, and this must be kept to such a small amount that the dies will not be prevented from practically coming together. About five minutes is re-

quired to mold a set of ten insulators in these dies.

The dies, after they have been opened and the work partly removed, are shown in Fig. 4. The base plate B is in the fore-

made of the same materials as corresponding parts of the dies shown in Fig. 1.

Molding Stators for Variometers

The stator of the variometer used in the Adams-Morgan regenerative circuit receiving set consists of a hollow spherical member which is molded in halves, each part carrying three flanges by means of which the two halves are joined. The rotor member of the variometer revolves within the stator and it has a shaft extending through the stator to which connection to the secondary winding is made. The bearings for this shaft are formed by two semi-circular grooves molded into each half of the stator, passing diametrically through two of the flanges mentioned. One of these stator members is shown lying on the die-plate in Fig. 6 and its

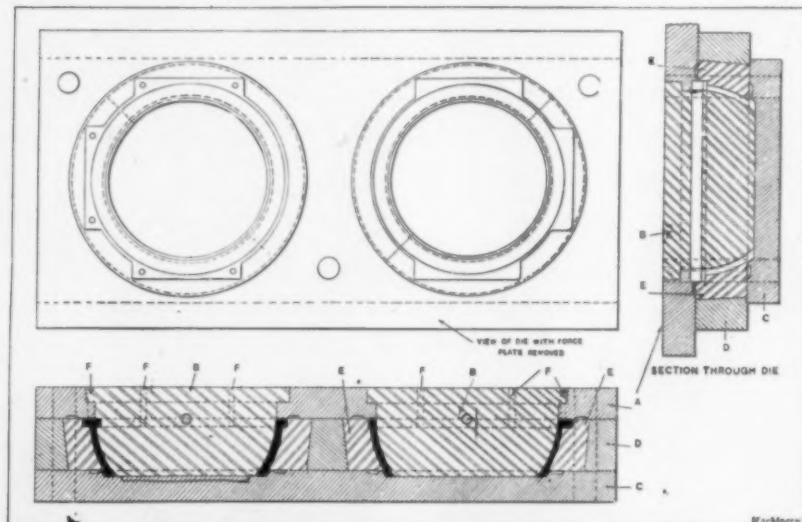


Fig. 5. Dies used in making stators for variometers.

ground and the three bars C are shown with the finished work as it appears when the dies are opened. The force plate A is shown in the background. It is necessary to scrape off all particles of plastic material which may have stuck to the matching surfaces of the die-plates, and if this is not done the dies will not be properly closed and will result in an unsatisfactory product. The die-plates, insert bars and pins are

sectional shape is indicated in Fig. 5, where the work is shown in the dies by solid black sectioning. The stators are made from *Shawlac* (a shellac composition) which is considerably less expensive than the condensation products, and, for certain uses, just as suitable. This material, in sheet form, is handled in molding much the same as other molding jobs wherein sheet stock is used.

(Continued on p. 450)



Fig. 6. Molding stators.

Development of Casein Solids

European pyroxylin producers have taken up the manufacture of these plastics on a large scale

By Marc Fontaine

From Revue Generale des matières Plastiques, 1926, 2, 92

This is continued from p. 396 of the November issue of PLASTICS.

The discovery of the casein plastics was described in the previous article.

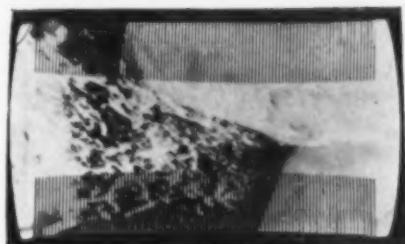
ANOTHER pyroxylin plant, in England this time, the British Xylonite Co., also entered the field of casein solids, manufacturing it at Hale End, London, and selling under the trade-name of *Lactoid*. The Erinoid Co., of England, started operations at Stroud (Gloucestershire) and at Montendre, the product bearing the name of *Erinoid*.

It is regrettable that there is no single name which represents the comprehensive term of casein solids, and it would be an excellent plan to adopt one to cover the material. Examples of other artificial materials bearing such name are Celluloid and Ebonite (hard rubber)*

We will now proceed to give some statistics regarding this rapidly growing industry, and believe that it will not be without interest to our readers to compare this industry with its nearest and most direct competitor, pyroxylin plastics.

Prior to 1914, the entire world production of casein solids was exclusively in the hands

of the Galalith Gesellschaft Hoff & Co., who monopolized the business. In 1904 this company manufactured about 600 tons of



Beautiful translucent hand-cut fine-comb made from casein plastics in Italy, the material being known as Zoolite.

casein solids per annum, at their factories at Harburg, in Germany; and Wimpassing in Austria. By 1913 the yearly production had reached 1500 tons, and doubled the following year, just as the war broke out. The total capacity of the Hoff & Co. plants at that time was 3000 tons per year. This represented a market value of upward of 10 million mark, worth at that time 2½ million dollars.

Germany was the first large consumer of casein solids, the largest fabricators being located at Berlin, Nuremburg, in various cities of Bavaria and Saxony, as well as some in the German section of the old Austro-Hungarian Empire. The factories at Vienna and Gablonz were famous for the diversity of their wares made from casein solids.

No definite figures are available of the gradual rise of the casein solids industry in Europe from the beginning in 1894 to 1914, as the Germans

classified this material with the pyroxylin plastics. Only a figure for 1912 is available, showing an exportation of 400 tons of "galalith" from Germany. In the same year Austria reported exports of but 60 tons, which went to England, and a mere 4 tons to France. The entire world export trade in this commodity in that year was thus less than 500 tons. The next year (1913) Germany increased her exports, and 20 tons of her product entered France. According to German statistical sources for 1912-13, North America, Japan, China and Argentine combined bought 100,000 marks worth of casein solids from Germany in that period; this representing the value of 25 tons; the total exports for the six months from January to June alone were 692 tons, while but 5 tons were imported. In 1924 the exports from Germany reached 730 tons for six months, with 30 tons of importation. The principal purchasers of German casein solids for 1924 were

Great Britain	127 tons
Checho-Slovakia	126 tons
Switzerland	123 tons
Austria	105 tons
Italy	87 tons
Other countries combined...	165 tons
Total	733 tons

The value of these exports was 3 million gold marks, or \$750,000.00. During the first six months of 1923, Switzerland consumed 160 tons of German casein solids, as against 123 of the preceding year, an increase of 37 tons, but its export trade increased. Possibly some of this material found its way to France, due to the diffi-

(Continued on page 446)

*(Apparently the French use the term "celluloid" as though it did not belong to a company. In America Celluloid is a trademark belonging to the Celluloid Co., and its use for other pyroxylin products is strictly forbidden. This again emphasizes the urgent necessity for adopting a universal trade-name for all such products which can only be described by circumlocution. What could be more awkward than the term pyroxylin plastic, phenol resin, casein solid, etc.? The sooner the trade organizations get together and decide what to call their product, the better it will be for all concerned.—Editor.)

"Karbolite"—A New Phenol Resin

Further details of this interesting Russian product

G. S. Petroff

A communication from the Kazan Institute of Chemistry at Moscow, Russia. From Kustoffe, 1926, 16, St. 107, 124.

See November PLASTICS
for the first part of this
article. (P. 319.)

Molders contemplating
making their own resins
will find this of interest.

THE anhydrous naphthasulfonic acids which are used in the production of Karbolite are readily soluble in alcohol,

resin by titration, after removal of the water by evaporation; 48.9% escaped detection by this means. This means that 13.5% of the naphthasulfonic acid had remained in the resin itself, although only 6.37% of that could be detected by analysis. The pulverized Karbolites, when extracted with solvents and water gave the following results. (See Tables 5 & 6). See Nov. Plastics.

all of it is recoverable by solvents. The action is quite probably analogous to what takes place in the vulcanization of rubber, for it is a well known fact that a large percentage of the sulfur in vulcanized rubber can be removed by solvents, while the balance of the sulfur is present in combination with rubber itself. Of the Karbolites examined, samples 1 and 4 were however technically useless as they were not sufficiently non-conducting. Sample No. 1 was made with too small an amount of formaldehyde. The product, although insoluble, was brittle. Karbolite No. 4, made with an excess of formaldehyde was damp and porous. Only the other two samples showed valuable properties.

The resistance to electrical puncture, or the breakdown strength of a poured 5-millimeter Karbolite plate, taken directly from the form and without special drying, was from 32,000 to 35,000 volts. After drying this reached a

TABLE 8

Dependence of dielectric properties upon type of raw material used.

Crystallized Phenol	Cresol (oil, sp. gr. 1.04)	Sulfonated Sun-flower oil	Sulfonated Castor oil	Naphtha- Sulfonic Acid (50%)	Break-down Voltage
100 parts	—	—	—	5 parts	14,260 Vts.
100 "	—	—	—	5 "	16,900 "
100 "	—	—	20 parts	10 "	22,320 "
100 "	—	15 parts	—	20 "	18,000 "
100 "	—	15 "	—	20 "	22,300 "
100 "	—	15 "	—	5 "	22,300 "
90 "	10 parts	—	—	8 "	19,800 "
90 "	10 "	—	—	10 "	15,000 "
75 "	25 "	—	—	25 "	19,600 "
		—	—	25 "	22,300 "
		—	—	25 "	31,000 "

Quite evidently the acid has undergone some change, as not

benzene and even in benzine, and for this reason can easily be extracted from the resin by means of solvents, provided the material is sufficiently finely divided. The amount of acid thus removed is given by the tables 3 and 4 below.

From the analysis and experiments made, it is quite evident that the initial soluble condensation product retains the greater part of the naphthasulfonic acids which act as catalysts, as only 8.19% of the acids were found in the aqueous layer at the end of the reaction. The balance of the naphthasulfonic acids is distributed as follows: 42.90% were detectable in the

TABLE 9
Condensation of crystalline phenols and naphthols in presence of naphthasulfonic acids.

Crystallized Phenol	Alpha- Naphthol	Beta- Naphthol	Naphtha- Sulfonic Acid	Break-down voltage of a plate:	
				5 mm. thick	2 mm. thick
95 parts	—	5 parts	5 parts	14,500 Vts.	8,600 Vts.
90 "	—	10 "	5 "	14,880 "	9,450 "
80 "	—	20 "	5 "	—	9,920 "
175 "	—	25 "	5 "	6,200 "	5,500 "
				(the plates burst into flame on	
				flame on	
100 "	—	—	5 "	13,200 Vts.	7,400 Vts.
95 "	5 parts	—	5 "	13,200 "	8,650 "
90 "	10 "	—	5 "	13,200 "	8,650 "
80 "	20 "	—	—	18,600 "	11,780 "

strength of from 65,000 to 72,000 volts, and a dielectric constant of from 5 to 6.

Dependence of the dielectric properties of condensation products upon the raw materials.

As the results of tests made by the various electric companies, insulators made solely from phenols do not stand up well against very high voltages. They become hot, smoke and eventually become conductors for the current. For example, insulators of the "Delta" type, rated at 40,000 volts, break down at as low as 15,000 volts. In fact, insulators made only from phenol are partly conducting. If made from mixtures of phenols and cresols, the properties are considerably better. In order to test these points further, experiments were conducted with two insulants and the other from phenol.

The phenol insulator contained 16.04% of water. The alcohol - benzene extractable amounted to 11.82%. It was found that the phenol insulator did not meet the requirements at all. Several casts were made, adding the formaldehyde in two stages, as already mentioned. The sulfonated oils, or sulfonic acids, were made in the usual way by treatment with 25% concentrated sulfuric acid, the

naphthasulfonic acids containing 50% of sulfoacids, 1.24 sulfuric acid and traces of iron. The properties of the different resins, etc. are given in Tables 8 and 9. From this it is certain that the addition of the naphtha sulfonic acids increases the resistance to puncture at high voltage, and that the use of cresol or creosote oils raises the dielectric properties.

Action of Naphthols

The addition of naphthols was also carefully studied, and it was found that with additions up to 20%, the dielectric properties continued to improve, but beyond that point again decreased. The experiments were made with beta-naphthol. Alpha-naphthol, on the other hand, does not appear to give the same advantageous results.

The effect of alkaline catalysts was also carefully studied, the results being best understood by reference to the tabulated data in table 8. It appears that the catalyst in alkaline condensation plays the same role exactly that it does in acid condensation. The oxide of the alkaline earth metals increase the dielectric strength of the synthetic resin. Additions of rosin and of turpentine, do not improve the product.

The effect of free phenols was

TABLE 11

The influence of free phenol and cresol, which have not reacted with the formaldehyde, and also the influence of glycerol upon the dielectric properties of hard and infusible condensation products.

The Karbolite had a composition: 80 parts phenol, 20 parts techn. cresol. A 5 mm. plate, before the introduction of the free phenol withstood a voltage of 22,320 volts for 1.5 minutes

Added crystallized phenol	Stood up at 22,320 volts for
1%	3.75 min.
2%	3.00
3%	3.00
4%	3.00
5%	2.30
6%	2.50
7%	1.50
8%	1.30

The Karbolite had a comp.: 80% phenol, 20% techn. cresol. 5 mm. plate withstood, before addition of the carbolic acid, a voltage of 21,700 volts for 1 minute

96% carbolic acid	Stood up at 21,700 volts for
1%	1 min.
2%	2
3%	2.5
4%	3.5
5%	5.5
6%	7.5
7%	4.0
8%	4.5
9%	2
10%	3.5

The Karbolite had a composition: 80% phenol, 20% techn. cresol. A 5 mm. plate, before the addition of the glycerol, stood up under 21,700 volts for 3.5 minutes

Added glycerol 2° Be.	Stood up at 21,700 volts for
1%	1.5 min.
2%	1.0
3%	2.0
4%	0.75
5%	2.0
6%	1.75
7%	1.00
8%	2.00
9%	1.50
10%	1.25

also studied. It was found that the addition of phenol and cresol, up to certain percentages, of course, did not lower the dielectric strength, but even showed a tendency to slightly increase it. Added glycerol, up to 10%, slightly lowered the dielectric strength.

Products obtained by the condensation of phenol and formaldehyde with turpentine, tar, and

(Continued on page 445)

TABLE 12

Hard and infusible condensation products prepared from carbolic acid, formaldehyde and turpentine, tar and sulfonated castor oil, in presence of alkaline and acid catalysts.

Technical carbolic acid	Formaldehyde, 40%	Sodium hydroxide	Naphthasulfonic acid	Turpentine	Coal tar	Sulfonated castor oil	Insoluble residue	Amount of extract
100	90	1.8 + 1.5 NH ₃	13.27%	—	—	—	84.26%	12.58%
100	90	1.29	—	—	—	—	94.98	4.10
100	90	1.29	—	16	—	—	87.07	8.69
75	10	1.29	—	12	—	—	60.36	20.90
75	70	—	9.5	—	—	37.5	67.70	32.16

Some Uses of Cellulose Acetate

The similarity of this cellulose ester to cellulose nitrate has led to development along analogous lines

By Maurice Deschiens

From Revue générale des matières Plastiques 192 62, 99

BESIDES its utilization on a large scale for the manufacture of the highest type of artificial silk, or Rayon, (such as *Cellanese*), and as a substitute for the pyroxylin plastics, cellulose acetate has been used for the following: just to cite a few of the better known applications.

Artificial Sponges.

A peculiar idea is that of V. Otto Repetz, who in his British patents 23,196, 1913, and 21,524, 1914, describes the manufacture of artificial sponges from cellulose acetate. He proceeds by first forming a sort of paste of cellulose acetate and cotton, together with some water-soluble substance such as ordinary salt or sugar. After the material has set, it is placed in water, when the soluble substance will dissolve leaving the cellulose acetate and fillers in the form of a sponge.

Incandescent Lamp Filaments.

This idea dates back thirty years, to the United States Patent of A. Little (532468, 1895), who was the first to describe a method for using cellulose acetate for this purpose. In this process the solution of the cellulose acetate is forced through a spinnaret into a coagulating bath, and the filament formed is then dried. It is later carbonized in order to produce the familiar type of carbon filament. The modern tungsten lamp has, however, practically rendered carbon filaments obsolete.

Explosives.

Although cellulose acetate it-

In the United States, the development of the cellulose acetate plastics has been much slower than abroad—apparently due to the strong intrenchment of the pyroxylin products. The manufacture of artificial silk from this source has, however, been brought to a high state of perfection. Cellulose acetate, due to its much lower combustibility, deserves a wider use in plastics than has occurred thus far.

self is scarcely combustible, it nevertheless has found some application in explosives. A. Luck, for example, in his British patent 24,662, 1898, adds small amounts of cellulose acetate to cellulose nitrate explosives such as Cordite, Ballistite, etc. The reason is to diminish the speed of combustion and the temperature, as well as to stabilize the explosive and to render the same less brisant. Another idea is that of E. Bouchaud-Praceiq who covers smokeless powder grains with a thin protective varnish of cellulose acetate, containing a dye sensitive to nitrous fumes, so that incipient decomposition of the powder will become evident. His method is covered by the French patent 445,770, of 1912.

Solid Alcohol.

L. Denayrouze, in his French patent 296132 (1900) used a mixture of cellulose nitrate and stearine for solidifying alcohol. The Bayer Co., however, in the following year obtained patent protection in Germany and other countries for the use of

cellulose acetate. (German patent 134721). According to this process, cellulose acetate is dissolved in acetic acid and enough alcohol is added to make the entire mass set into a jelly. For instance, 100 grams of cellulose acetate are dissolved with 500 grams of glacial acetic acid and the solution poured into 2000 cu. cm. of alcohol.

The solution gels in part; any unsolidified portion is poured off. Alternative methods for the use of cellulose acetate depend upon the fact that certain types of this cellulose ester are soluble in hot alcohol, and the gels are obtained by cooling the solution.

Phonograph Records.

A. and L. Lumiere, in French patent 338,849 (1903) made phonograph records from a mixture of cellulose acetate and sodium soaps, such as sodium oleate, margarate, stearate or palmitate. The acetate was dissolved in the usual solvents before mixing with these substances. A. Eichengruen made shellac disc records (British patent 17,574, 1912), and covered them with a cellulose acetate film.

Cements, Adhesives and Rubber Substitutes

Usually orthopedic and surgical non-permeable bandages are made by impregnating silk or other fabrics with varnishes or dopes made of cellulose acetate. A German patent (396576) describes the following dope for treating thin fabrics:

Cellulose acetate	10 grams.
Acetone or other light solvent	55 grams.
Dime thyl phthalate	24.2 grams.

(Continued on page 447)

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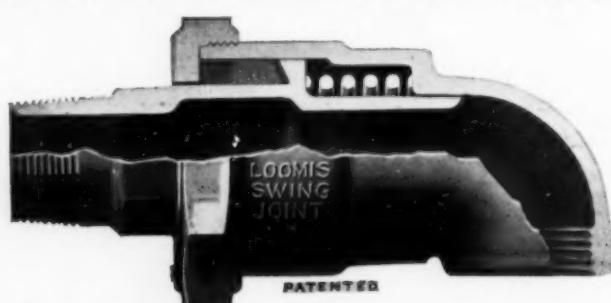
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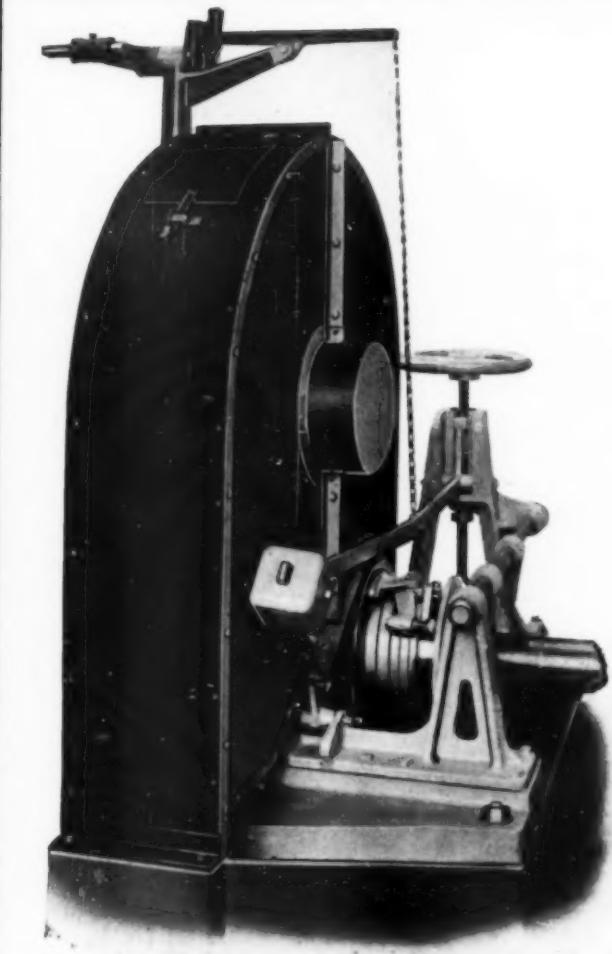
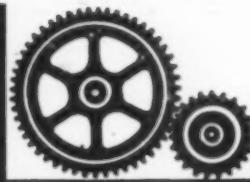
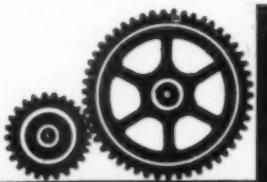


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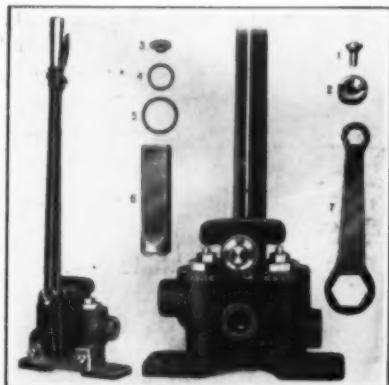
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EDITORIAL · IMPRESSIONS

New Era In Field of Phenol Resins

THE Phenol Resins, without any doubt whatsoever, are sweeping everything before them in the field of hot-molded products, as their unique property of hardening under heat and pressure distinguishes them from every other molding composition, either past or present.

For about fifteen years, the market was controlled very successfully by the Bakelite patentees, especially the highly-important "heat and pressure" patent, which was sustained by the courts on many occasions, and eventually led to the formation of the Bakelite Corporation from the Bakelite Co., The Redmanol Co. and the Condensite Co.

Needless to say, the credit for developing the phenol resins in this country belongs to the research workers of these three companies, and especially to such men as Baekeland, Redman, Aylsworth and others, the patentees who gave the products to the world.

Now that one of these patents is about to expire, and therefore become open to the public, several new concerns are entering the field, and there is little doubt but that in the near future the molder and the general consumer will be offered phenol resins under other than the old familiar names.

Several are already in production, and are pushing their individual trade-marked products. The general public has no way of distinguishing the phenol resins by their mere appearance, and hence they all look alike to them. Obviously if made from the same materials, or at least close analogous substances, they really and truly are the same, differing only in the excellence

attained by the individual manufacturers and molders.

In all fairness to the new factors in the field, it must be stated that the products thus far offered appear to be every bit as good as the old stand-bys. Undoubtedly the European manufacturers of phenol resins and their products will now be able to export their material to this country, despite the comparatively meagre tariff protection, so that the industry is sure to face a period of stiff competition.

A word of warning is, therefore, not out of place. "Competition is the life of Trade," so runs an old proverb, but such competition must be in the nature of friendly rivalry, and emphatically not in the nature of "cut-throat" and "price slashing" contests. The old, large concerns will of course be compelled to follow, at least partially, any radical reduction in prices on the part of the newcomers, but the field of molded phenol-resin products is so large that there really ought to be room for all of them.

The saving in labor possible when molding instead of machining is so great, and the item of the material itself rather subordinated to the cost of the finished article, so that a disastrous price-war would benefit no one, neither the molder, nor the consumer, and least of all the producer.

It is sincerely hoped that common sense will prevail, and that the development of the industry will follow healthy and sane lines. Of course actual price-fixing is against the Sherman Law, but nevertheless the rule of reason in fixing prices should prevail.

Creative Endeavors

MID-WINTER is usually a slack season for the producers of pyroxylin plastic articles, but provides an excellent time for the development of new styles and the working out of possible new uses.

One of the outstanding features of pyroxylin plastics is the ability to work with thin sheet stock and to produce very fine blown or drawn objects. The production of such articles, provided with an internal filler of cementitious substances, makes it possible to prepare very attractive ornamental goods for display, and other purposes. The additional resistance to breakage and crushing add to their value.

So if you have time hanging on your hands, proceed to employ it profitably in developing the market for new goods.

Creative genius has a field in every human endeavor, and in a business depending to a large extent upon the designer, much can be done to meet competition in a fair manner, and to reap the real rewards of merit.

Why Not?

IT would indeed be a happy event if the producers of the phenol resins and analogous hardenable molding powders could be gotten together in a Manufacturers Trade Organization to further the use and application of these versatile, modern industrial products.

Such a trade organization could do a great deal to further the use of phenol resins by a national advertising campaign, apprising the consumer of the merits and advantages of *molded products* as a perfect substitute for articles now made by machining operations, and even

as a substitute for metals. This would be especially valuable if, at the same time, they could agree upon a commonly owned trade-name for these condensation products, as the term "phenol resin" sounds entirely too technical to the untrained ear.

Such a campaign could well emblazon upon its banner the slogan "*Mold it for Profit.*"

You all remember the campaign of the paint producers who advertised nationally with the slogan "Save the surface and you save all."

Another angle would be the joint support of an industrial development laboratory as distinct from the research laboratories of the individual concerns. Steps along this line have been taken by other groups of producers such as the paint manufacturers, who maintain an industrial research laboratory at Washington where problems confronting the paint trade are worked on, the information being given to the public or to the manufacturers, depending upon its nature.

This projected organization could devote its energy to the development of short cuts in molding methods, new applications of the resins, assisting manufacturers in adopting molded resin products in place of articles now made of metals or machined, and in countless ways enlarge the field, so that the increased consumption of the phenol products would readily absorb the increased output.

Plastics would be more than pleased to open its pages to the publication of such development work, and thus to serve as a means of liaison between the molders and the producers, as well as the consumer.

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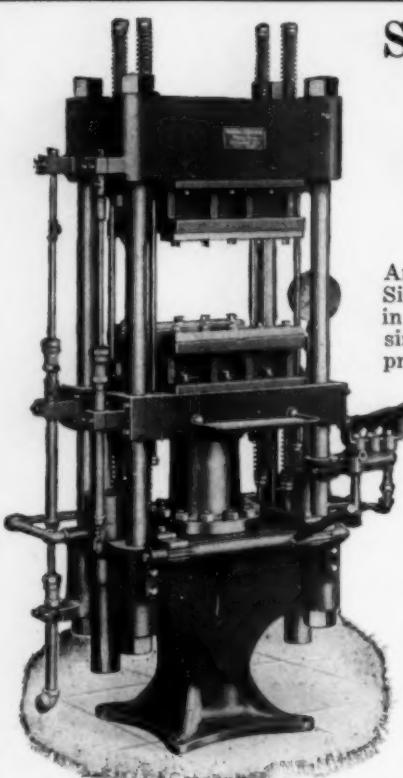
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Development of the Casein Solids

(Continued from page 435)

culties with the franc at that time which would make such indirect trade profitable.

In France, however, the casein solids industry is distinctly a "child of war." The Galalith companies French branch closed its doors when the war broke out. The French pyroxylin plastic manufacturers, sensing the danger of the competition from the new product, seized the opportunity to engage in its manufacture themselves. Actual present French production probably exceeds 2000 tons per year. America probably produces 1000 to 1200 tons yearly (i. e. in 1925). With Germany and Chechoslovakia's production close to 5,000 tons yearly, this would bring the entire world production to 10,000 tons. For a comparatively recent industry, which had to make a place for itself in the face of strong competition, this is not at all a bad showing.

Due to the admitted superiority in design and novelty of the French "articles de Paris," the trade in casein solids articles is expanding, and the daily consumption in France alone is now not less than 3 tons daily.

(This series of articles will be continued. The next points taken up are: comparison of casein solids and pyroxylin plastics from an economic standpoint. World production of pyroxylin plastics; the raw materials used in the two industries; and the details of the manufacturing operations).

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"Karbolite"—A New Phenol Resin

(Continued from page 437)

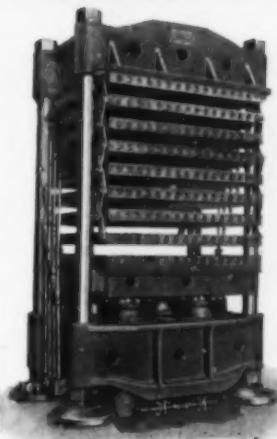
sulfonated castor oil in presence of acid, and of alkaline catalysts was also investigated, the results being given in table 10. The products, which are of the hard and infusible type, were powdered, and the powders extracted with a 1:1 benzene-alcohol mixture. Russian turpentine was used in the reaction. The coal tar employed was purified for the purpose of removing all constituents boiling below 270°C. The sulfonated castor oil was made by subjecting the oil to the action of sulfuric acid (having a specific gravity of 1.82) at from 15 to 25°C, using 25% of acid.

The conclusions reached as a result of these experiments show that on comparing the pure condensation products of phenols and formaldehyde made with alkaline catalysts with those made by the aid of naphthal-sulfonic acids in conjunction with added materials such as turpentine coal tar, sulfonated castor oil, etc. it appears that these added materials act just simply as so much filler, as the analytic data show that the amount of extractable material is increased by such additions, while at the same time the amount of insoluble resin is reduced.

Behavior of the Karbolite on Heating.

On heating properly prepared Karbolite to 100°C, there is no noticeable change. At temperatures above 120 to 130°C there is some softening, this increasing as the temperature rises to 180 to 200°C. If the heating is carried out in the presence of air, the Karbolite becomes darker, and finally fissures commence to form. Karbolite will burn as long as it is held into a flame, but stops burning as soon as it is removed from the same.

Karbolite was found to be quite resistant to acid. For ex-



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ample concentrated sulfuric acid (sp. gr. 1.84) did not attack the material even when the same was exposed to this acid for three weeks at room temperature. The acid was only very slightly discolored and the Karbolite became somewhat red. Sulfuric acid of from 70 to 80% strength, poured into a Karbolite container does not become discolored, nor is the Karbolite affected in any way.

On prolonged heating with acid of this strength to from 80 to 100°C there is some coloration developed in the acid, but no destruction or attack on the Karbolite was noticed. Diluted sulfuric acid, as well as hydrochloric acid, phosphoric acid and acetic acid do not attack the Karbolite either hot or cold.

Fuming nitric acid, sp. gr. 1.4 bromine, and sulfur chloride will destroy the Karbolite on heating. Chlorine developed from calcium hypochlorite has no measurable action upon the resin.

Alkaline liquors, both dilute and concentrated, exert a destructive action both when cold or when hot, especially upon prolonged exposure. This destructive action of the alkalies can be diminished, and even completely arrested by addition of naphthalene sulfonic acids or of coal-tar products.

Subjected to the action of organic solvents, Karbolite swells and becomes full of fissures. This is especially noticeable when the material is exposed for some time to ethyl alcohol, methanol, chloroform, and benzene. However, petroleum benzene and mineral oils do not affect it. All of the investigations reported upon in this series of experiments were carried out with the clear phenol resin itself which did not have any fillers, such as asbestos, cellulose, and similar materials, added to it.

Another New Resin,
THIOLITE—in Jan.

Some Uses of Cellulose Acetate

(Continued from page 438)

On a similar principle, cellulose acetate solution, when sufficiently concentrated can be used as an adhesive cement. An excellent example of this type of product is the following:

Cellulose acetate	100 to 130 grams.
Acetone	450 to 550 grams.
Ethyl alcohol	125 to 200 grams.
Benzene	125 to 200 grams.
Benzyl alcohol	50 to 65 grams.

The acetone in the above formula can be replaced by methyl acetate, ethyl formate or by tetrachloroethane.

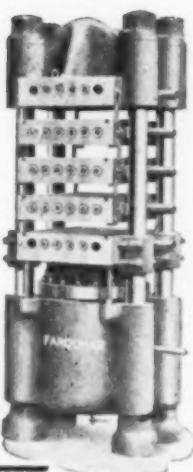
A mass very much like rubber can be made in accordance with the directions given in the French patent of the Aktien Gesellschaft für Anilinfabrikation (463622). 5 grams of cellulose acetate are mixed with 10 grams of triacetine. Other similar plasticizers can be used. The product is quite soft and elastic.

Similar cements or plastic products are described by W. Plinatus (French patent 581182 (1924), consist of a mixture of cellulose acetate and a glycerol ester such as triacetin and tributyrin. A second patent (581189) makes use of solutions of cellulose acetate together with esters of mono- or poly-alcohols. The solutions can also obtain albuminous, fibrous or mineral substances as binders.

Re-inforcing Rayon

Another rather peculiar use is for re-inforcing the regular cellulose artificial silk or Rayon. The Compagnie Generale des Applications de la Cellulose took out at French patent in 1910 (417599) for the use of cellulose acetate solutions for re-inforcing or strengthening such artificial silks as are made by the Chardonnet, cuprammonium or viscose processes. A 10% solution of the cellulose acetate in acetone, with addition of some tetrachloroethane and plasticizers is used, the silks being

(Continued on page 450)



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Production Methods in Molding

(Continued from page 434)

The construction of the dies is plainly indicated in Fig. 5 where sectional views are shown and a plan view with the force plate removed. The force plate A carries two force plugs B, through each of which there extends a steel pin, the center line of which coincides with the parting line of the stator halves. These pins extend on both sides of plugs B and are the means of forming the half bearings for the rotor shaft in the flanges. The base plate C carries an intermediate plate D known as the "chase". The chase is machined to receive two split rings E for each mold, the rings being located in proper position by pins carried in the base plate. The necessity for this construction will be apparent when the sectional shape of the stator is observed. It would be impossible to remove the work from the dies, on account of the rib at the small end, if the construction did not permit a side draw.

Overflow channels for the excess stock are provided in the force plate and in the base plate, which are shown located close enough to the mold cavity to permit the plastic material to ooze into them when under pressure. Two holes are molded in each of the three flanges for the purpose of assembling the two members together and these holes are formed by pins F carried in the force plate. The force plate is made of unhardened tool steel; the base plate, chase, plugs and split rings from pack-hardened machine steel, and the pins and dowels from drill rod. The view shown in Fig. 6 should be self-explanatory after what has already been said regarding the preparation of molds for the production of

other articles. The operator is in the act of cutting the sheet stock to fill in around the split die rings, these having been removed for one of the two impressions; they are lying on the heated work-plate just back of the dies.



Fig. 9. Weighing out the molding material.

Bases for Filament Rheostats

All the examples of molded work described up to this time have been made of sheet stock, and have been produced in negative molds. When an article is produced by the positive method, the raw material is used in the form of powder and is carefully weighed so that each charge will contain no excess material. The DeForest filament rheostat is made in this way. It is molded from No. 160 Condensite powder and the operation of preparing the mold for this job is illustrated in Fig. 7. Views of the work are shown in the lower right-hand corner of Fig. 8 in which illustration sectional views and a plan view of the dies are also presented. The general die arrangement is not radically different from that already described, except of course, that there is no overflow channel. When the work is removed from the die impressions

of a positive mold, there will be no perceptible fin or burr produced, if the charge has been weighed out accurately.

The force plate A carries the force plugs B which extend into the chase C as shown, when the die is assembled. Similarly, other plugs in the base plate D extend up sufficiently to produce the proper die cavities within the chase. The plugs in the force plate form the countersunk hole E and the two small holes leading from it which are countersunk on the opposite side of the work; also these plugs carry a T-shaped member for forming slot F. The faces of the plugs in the base plate contain cavities in which the arc-shaped lug G is formed; also a T-shaped projection for slot H and pins for forming the countersinks J.

The longitudinal sectional view shows the dies with one plug removed from both the base and force plates and with both plugs in place in the third station, where a section of the work is shown in heavy lines. The amount of displacement of the charge of powdered condensite is reduced by the 2000 pounds per square inch hydraulic pressure exerted, to approximately one-third its original volume. In designing a positive mold it is, of course, essential to know the exact amount that the material is compressed into so that the depth of the chase can be determined accurately; otherwise the work will be molded too thick or too thin, as the case may be. The materials that are used in making the various die parts are the same as those used in similar die parts already described.

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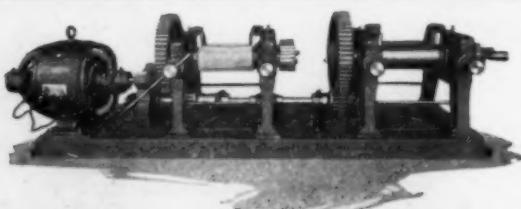
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Some Uses of Cellulose Acetate

(Continued on page 447)

drawn through the solution and then dried.

Artificial Horse Hair, Fabrics and Films

Artificial horse hair can be made from heavy solutions of cellulose acetate by squirting the solution through rather large spinnarets, see German patent 123,309 and 129,420), combining the filaments into strands, and passing the strands through a solution of cellulose acetate. The partly dissolved filaments are then passed into an alcoholic coagulating bath. Benno Berzykowsky, in his French patent 424,428, 1910, also describes a method for making horse-hair. The crude acetating bath containing the cellulose acetate is forced into coagulating baths containing water, benzine or turpentine. Such horse hair can be colored by the dyes used for acetate silk.

Whole fabrics are capable of being formed by applying heavy solutions of cellulose acetate to engraved cylinders or plates. This is practically equal to molding a film or colorless or colored cellulose acetate. Similar methods, only using a coagulating bath to set the cellulose acetate solution on a cylinder of travelling belt, are also used.

"Bayko Yarn"

A thread known in the European trade as "Bayko yarn" is made by applying a coating of cellulose acetate to natural textile threads, metallic or bronze powders being also employed. The metallized threads are then covered with a colorless cellulose acetate varnish to preserve them. These yarns are used in making gold and silver braid for ornamenting uniforms, etc. In all the uses of cellulose acetate, the choice of the plasticizers is of the utmost importance. In addition to the cellulose acetate, other esters of this substance, such as the formates,

butyrates, oxalates, and benzoates, are known and await commercial exploitation. Undoubtedly some of them will prove useful for certain qualities peculiar to the particular ester, and missing from the other esters. Otherwise, some of them may prove too expensive. The cellulose ethers, such as the methyl ethyl and benzyl ethers are exceptionally valuable.

It remains for the future to decide what role these other esters will play in the industries now relying solely upon cellulose nitrate and acetate.

Japan's Button Trade

Osaka, Japan—In buttons the business done during September and early October in suiting and waistcoat lines has increased and the market is quiet. Prices hold, however, owing to the small stock left of the season's output. Imported suiting 7-sun require 6.50 yen and the Japanese waistcoating 1.80 yen per gross.

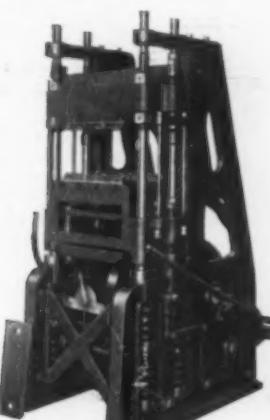
Active conditions are expected shortly.

"Molded Mud"

A large amount of molded material, especially in the form of ink wells and covers for the same, is apparently being dumped on the market. Physically the material, both in color and texture looks like phenol resin—but it breaks at the least jar or pressure. Quite evidently it is simply a cheap rosin or possibly (although we doubt it) shellac plastic having an overdose of filler.

Such stuff undermines the public's confidence in the strength of molded goods. It is simply "molded mud" as one who saw it aptly dubbed it.

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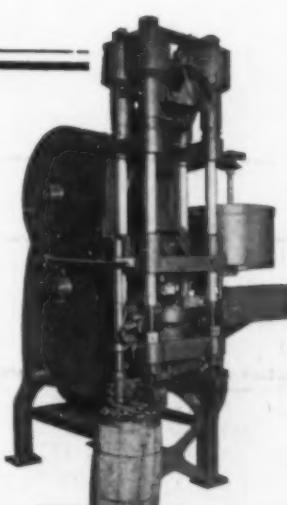
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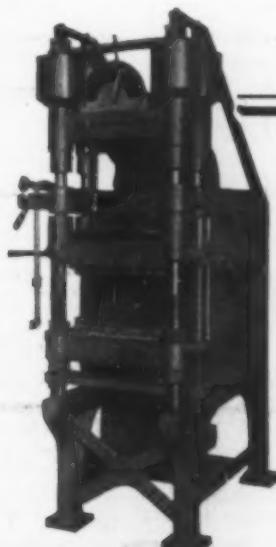
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Model C-1



Model A-1

TECHNICAL ABSTRACTS AND PATENT REVIEW

Molded Radio-tube Socket. Warren F. Kaynor, assignor to Waterbury Button Co., Waterbury, Conn. U. S. P. 1,584,303; May 11, 1926.

In order to prevent the softening of the thermoplastic molded portions of the socket when the same is installed in a set and brought near a soldering iron, heatinsulating discs are placed in the form of washers about the binding posts.

Expansion-joint for Concrete Construction. Albert C. Fischer, Chicago, Ill. U. S. P. 1,582,880; Apr. 27, 1926.

A pre-molded expansion joint for concrete constructions comprising a bituminous material having excelsior incorporated therein.

Pyroxylin-plastic Knobs. David S. Bartlett, Springfield, Mass. U. S. P. 1,582,502; Apr. 17, 1926.

A number of fairly thick sheets of colored pyroxylin plastic material are superimposed and welded together. From this material round knobs are machined out, a hole being provided for the introduction of, say, the gearshift lever of a motor car or the like. Many different color effects are thus possible.

Gelatin Films by Aid of Cellulose-Ester Films. William Hoskins, Chicago, Ill. U. S. P. 1,582,605; Apr. 27, 1926.

Film of some cellulose ester material, such as the nitrate or acetate, are used for forming gelatin films. The gelatin solution is applied to the film continuously and hardened with formaldehyde solution, dried and eventually stripped from the cellulose ester film support; which can be used over and over again. As the cellulose ester film may be provided with engravings or other raised or depressed marking, such marking can be perfectly reproduced upon the gelatin film, as in the hardening and drying operations it will very tightly adhere to the cellulose ester base.

Eyeglass Frames (Ophthalmic Mountings). R. A. Stevens, assignor to Bausch & Lomb Optical Co., Rochester, N. Y. U. S. P. 1,576,871; Mar. 16, 1926.

An ophthalmic mounting comprising a member constituted of plastic material, a substantially flat hinge plate having a portion biting into and embedded within the member, and means for securing the hinge plate to the member, the hinge plate having a relatively non-pliable portion and a relatively pliable portion, to facilitate adjustment of the hinge plate at the relatively pliable portion.

Compact-Folding Eyeglass Frame (Ophthalmic Mounting). A. E. Jeaneret, assignor to Bausch & Lomb Optical Co., Rochester, N. Y. U. S. P. 1,576,872 and 1,576,873; Mar. 16, 1926.

ing a pivot ear that is obliquely disposed to the line joining the ear and the center of the rim and having substantially parallel walls secured to the end piece with the walls substantially parallel to the line joining the ear and the center of the rim, and a temple pivoted to the ear, whereby the temple is adapted to pivot about the ear in a plane positioned at one side of the center of the rim.

Eyeglass Frames (Ophthalmic Mountings). F. A. Stevens and J. W. Welsh, assignors to Bausch & Lomb Optical Co., Rochester, N. Y. U. S. P. 1,576,868; Mar. 16, 1926.

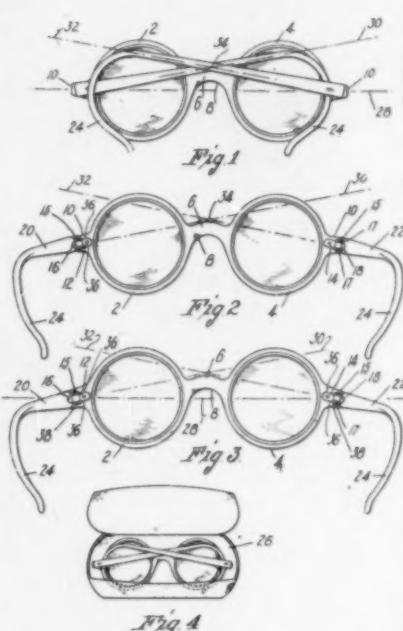
An ophthalmic mounting comprising a lens-holding frame and a temple, one of which comprises non-metal material and is provided with a recess, a hinge pivotally connecting the frame and the temple comprising a hinge plate mounted in the recess, and a screw extending through the non-metal material and the hinge plate for securing the hinge plate to the non-metal material, the screw being upset to cause its body portion to bulge, whereby the threads of the screw bite into the non-metal material to effect a very tight union of the parts.

Eyeglass Frames (Ophthalmic Mountings). F. A. Stevens and J. W. Welsh, assignors to Bausch & Lomb Optical Co., Rochester, N. Y. U. S. P. 1,576,869; Mar. 16, 1926.

An ophthalmic mounting comprising a non-metal front provided with an integral extension at one side, a temple, and a hinge pivotally connecting the front and the temple, the hinge comprising a plate-shaped member having oppositely disposed substantially flat sides and having a knuckle disposed on one of the substantially flat sides and an attachment member integrally extending from the other substantially flat side and embedded in the extension, the temple being pivoted to the knuckle.

Eyeglass Frames (Ophthalmic Mountings). F. A. Stevens and J. W. Welsh, assignors to Bausch & Lomb Optical Co., Rochester, N. Y. U. S. P. 1,576,870; Mar. 16, 1926.

The combination, in an ophthalmic mounting, with a non-metal lens frame formed at one side with an extension, and a temple, of a hinged connection between the temple and the extension embodying a member having ears nearer one end thereof than the other, and anchoring projections at opposite ends of said member, one of said projections being nearer the ears than the other.



Deals with an "all-shell" frame so constructed that the temples fold in the manner shown on the figures above. Saving in size of the carrying case is the main advantage. By making the pivot-ears oblique to the line 28 on the drawings, the earpieces fold so as to lie virtually upon the lens-frames themselves, when the glasses are folded up. Eight claims, of which the last reads:

An ophthalmic mounting comprising two lens-holding rims and a bridge integrally connecting the lens-holding rims and all constituted of non-metallic material, the rims each having an integral end piece at a point opposite to the bridge, a hinge member secured to each end piece having substantially parallel walls and a pivot ear that is obliquely arranged to the line joining the centers of the rims, and a temple pivoted to each ear, whereby the temple is adapted to pivot about the corresponding ear in a plane oblique to the said line joining the centers of the rims.

Claim 1 of the second patent reads: An ophthalmic mounting comprising a lens-holding rim constituted of non-metallic material having an integral end piece, a hinge member hav-

Treating Waste Moving-picture Films.
David B. MacDonald, Leicester, England. U. S. P. 1,582,847; Apr. 27, 1926.

Purpose is to recover both the silver and the gelatine from the film without necessarily destroying or injuring the pyroxylin film support. The film is passed first through a solution of sodium sulfate, followed by a bath, such as copper chloride or copper sulfate and hydrochloric acid to convert the silver of the photographic image into silver chloride. The silver chloride is then removed by dissolving in the usual fixing agents or other materials in which it is soluble. After various other treatments designed to remove objectionable metal salts, the gelatin is dissolved off by hot water and can be re-used. The silver is recovered from the solutions by electrolysis.

Plastics Compositions. Zenos P. Romerill, Ogden, Utah. U. S. P. 1,586,045 and 1,586,046; May 25, 1926.

(1) A Plastic compositions consisting of powdered calcined magnesite 42 lbs., a natural product of weathered siliceous and calcereous rock with vegetable matter intermixed, 33 1/3 lbs.; powdered silica 5 lbs.; acre 5 lbs.; calcite 5 lbs.; sawdust 6 lbs.; powdered rubber 5 lbs.; and 2 gallons of 20% crude magnesium chloride solution.

(2) Weathered siliceous and calcereous rock in disintegrated condition with vegetable matter intermixed 60 lbs.; calcined magnesite 25 lbs.; asbestos 15 lbs.; sand 25 lbs. and magnesium chloride 10 gallons.

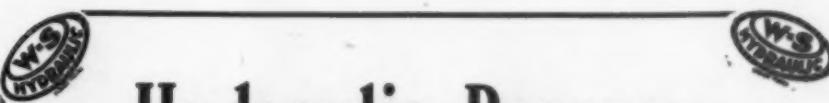
Main purpose is to provide heat-insulating material and wall tile, etc.

Permanently Pliable Cellulose Ether Films. William R. Webb, assignor to Eastman Kodak Co., Rochester, N. Y. U. S. P. 1,583,709; May 4, 1926.

Films made of cellulose ethers such as ethyl cellulose may be kept permanently pliable and soft by rendering them very slightly alkaline and taking proper precautions to keep them that way after manufacture. An alkalinity slightly in excess of Ph-7, or about 1/10% of alkali on the percentage of ethyl cellulose in the film is most suitable. Such films are stated to have remained perfectly pliable for weeks and months even though heated to 65°C. Similar films, not alkaline, became brittle under the same conditions.

Loud-speaker Horn. Ferdinand F. Bruckner, assignor to the Miller Rubber Co., Akron, O. U. S. P. 1,582,507; Apr. 27, 1926.

A loud-speaker horn made in two sections. The bell portion is made of cellular hard rubber, molded over a core, the neck or sinuous portion being made of blown hard rubber. The two parts are joined by vulcanization.



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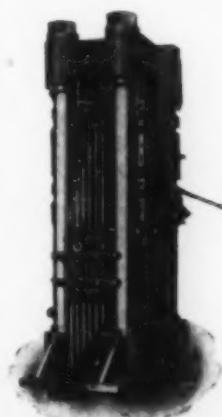
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Eyeglass Frames; Improvements in Connecting Metal and Pyroxylin Portions. F. A. Stevens, assignor to Bausch & Lomb Optical Co., Rochester, N. Y. U. S. P. 1,576,874; Mar. 16, 1926.

Expands the tabular section of the temple pieces, inserts the pronged end of the metallic portion and then compresses to original size so that the pyroxylin plastic bites upon the metal, making a tight joint.

What is claimed as new is:

A method of making articles of the class described that comprises providing a non-metallic member having a bore, the non-metallic member being adapted to retain a normal shape, expanding the bore, whereby the member is distorted from the normal shape, then inserting into the expanded bore a metal member having projections and of cross dimension greater than the cross dimension of the original bore and less than the cross dimension of the expanded bore, whereby the non-metallic material will not be displaced by the act of inserting the metal member into the bore, and finally restoring the member to its normal shape, whereby the non-metallic material adjacent to the projections is restored to substantially its normal shape.

Hard Resins. Eugen Schall, Feuerbach, Germany. U. S. P. 1,583,014; May 4, 1926.

Hard oil-soluble resins are produced by mixing finely pulverized resin with a mixture of sodium chloride, sodium sulfate and cobalt acetate and subjecting the mixture to heat in a stream of air until it has the desired degree of hardness.

Comb. George B. Canada, Memphis, Tenn., assignor of one-half to James B. Holley. U. S. P. 1,585,231; May 18, 1926.

The fine teeth lie in a different plane than the coarse teeth, the back of the comb being twisted at the point where the fine and coarse teeth adjoin. The purpose is to provide a comb better suitable for barber's use in hair cutting as it is claimed to avoid the tiring twist to the wrist of the operator. Both "right-handed" and "left-handed" combs can be made.

Molding Machine for Making Phenol-resin Switch-plates, Etc. Lawrence S. Seybold, Jackson, Mich., assignor to Reynolds Spring Co., Jackson, Mich. U. S. P. 1,587,431; June 1, 1926.

An hydraulic molding press so constructed that switch-plates of phenol-resin material can be manufactured rapidly and accurately. Both heating and chilling is provided for and the finished plates are automatically ejected from the machine. The plates are recessed on the reverse side.

(As these can be made in a great variety of colors, and have the additional advantage of being an insulator, it is certain that this type of switch plate will be exceedingly popular and may completely replace the present metal types. Ed).



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Australian Business

Mr. Thomas J. Masse, General Manager of Masse Batteries, Ltd., of Sydney, N. S. W., Australia, is visiting America on a business trip. He is here to secure the patent right for the manufacture of one-piece storage battery containers, and expects to spend several weeks visiting various plants in the United States and Canada.

Mr. Masse dropped in at our editorial offices and informed us that the opportunities for molded electrical goods were very good in Australia, provided that only the raw materials were imported there, and the molding done in that country, as there is a duty on the finished goods

Out Dec. 15
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Directory, Index
Buyers' Guide
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WANTS

A new article can be molded of pyroxylin. Nothing like it on the market. There is a demand for it and it is saleable, and now inventor desires to make connection with reliable manufacturer on royalty basis.

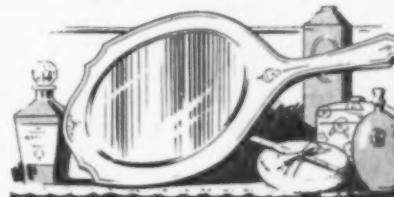
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which amounts, in some instances, to as high as 100% ad valorem.

The radio business is in a very flourishing condition and Australian made parts are finding a ready sale. Due to the comparatively small production, prices are high and good profits can still be realized. American exporters of molding powders and similar raw materials might find this market of interest to them.

Molding without
hydraulic presses.
See January
PLASTICS

Waste Hard Rubber used in Cellulose Nitrate Lacquers

Vulcanized rubber, especially of the kind known as hard rubber, which contains as much as 40 per cent. of sulfur, is a material which when once hardened is generally considered as being about as unchangeable as well can be.

The waste arising from the cutting and other mechanical working of this material has usually been discarded as more or less worthless, although processes have been described for re-using it in plastic compositions.

However, recent researches undertaken by the Eastman Kodak Co. appear to have brought out the fact that this material can be used in a coating composition in conjunction with cellulose nitrate, and the inventors of the process, Samuel E. Shepard and John J. Schmitt have assigned patent 1,583,703 to this company.

The patent describes a method for the fluxing and dissolving of hard-rubber scrap and its eventual incorporation in a flowable coating composition somewhat analogous to the pyroxylin lacquers. The inventors state that the composition can be applied by brushing, dipping or spraying and will form a hard, waterproof resistant coating exhibiting considerable lustre.

In making the composition, the rubber is first digested with a solution of 5 per cent. caustic soda for from 2 to 5 hours near the boiling point. This greatly facilitates the rapid and uniform fusing of the rubber, and also serves to remove some of the sulfur from it. The rubber is then washed free from alkali before the next step. This consists in making a melt of 28 parts of rosin, or some other resins as Pontianak, kauri, Manila, Zanzibar and the like, with 12 parts of China wood oil. Into the forty parts of flux thus

made, 60 parts of the comminuted and treated rubber are introduced and the composition is heated to from 200 to 250°C until a homogeneous mass is obtained.

It was found that this mass would readily and completely dissolve in ordinary commercial benzene (benzol) or coal-tar naphtha. A preferred mixture is 120 parts of benzene, 180 parts of coal-tar naphtha and 100 parts of the fluxed rubber composition.

The cellulose nitrate or pyroxylin part of the new coating composition consists simply in a solution of low-viscosity pyroxylin in an inexpensive solvent such as ethyl acetate. The inventors refer to some of the processes for preparing such low-viscosity cellulose nitrate which have already been described in PLASTICS some months back.

For instance, 32 ounces of the low-viscosity pyroxylin is dissolved in a gallon of ethyl acetate. The solution thus obtained is miscible over a wide range with the rubber solution, and forms a practical and useful lacquer. It will dry in 20 minutes

Recent Custom Decisions and American Pyroxylin Exports

Domestic Exports of Pyroxylin Products, From the United States, By Countries

Month of July, 1926

Countries	9820		9821		Manufactures of	
	In sheets, rods or tubes	Lbs.	Dollars	Lbs.	Dollars	
Austria				600	600	
France				165	375	
Irish Free State	65	122		13	11	
Italy						
United Kingdom	21,210	13,752	161,699	156,008		
Canada	84,628	61,670	67,449	66,737		
Gautemala	21	12	48	182		
Nicaragua				152	201	
Panama	11	14	15	44		
Salvador				76	267	
Mexico	967	897	1,216	2,307		
Newfound & Labrador	38	39				
Cuba	38	39	1,216	2,307		
Dominican Republic	721	718	1,374	2,340		
Argentina				181	127	
Brazil	36	45	467	1,081		
Colombia	46	60	322	526		
British Guiana	32	34				
Peru			1,094	1,332		
Venezuela	43	50	84	320		
British India	230	222				
British Malaya	102	120				
Ceylon	10	12				
China	38	44				
Java and Madura	80	175				
Hongkong				61	250	
Japan, including Chosen				15	25	
Philippine Islands				367	825	
Australia	16,161	12,906	7,437	13,117		
New Zealand				355	145	
British S. Africa				93	517	
Total		124, \$90,892	243,307	\$247,426		

The Board of General Appraisers and the Treasury Department of the U. S. has recently decided some cases of interest to the Plastics trade. Asked to give an opinion as to the duty to be leveled against certain articles coming under the heading of articles not otherwise described, they decided as follows:

Ivory or bone beads, temporarily strung:

Ivory beads, 45% ad valorem; Bone beads, 35% ad valorem; (the regular duty having been 60%).

Gelatin, in such form as to be partially insolubilized, (i. e. analogous to casein solids), 42.25% ad valorem.

Tooth brushes and eye-brow brushes, made of pyroxylin plastics, and where the chief value lies in the bristles, 45% ad valorem instead of 60% ad valorem (which latter figure is that for pyroxylin plastic articles). Such brushes are hence classified with toilet brushes in general. (Appraisers Decisions 51924, 51984 and 51989).

at room temperature. The color ranges from brown to black, and can be darkened by adding suitable coloring matter.

It will be seen that this process proved an outlet not only for waste hard rubber scrap but also for pyroxylin scrap.

More Buttons

Button manufacturers will greet this new trend in fashion with loud and heartfelt hurrahs. After a period of leaness—a period which saw the use of buttons in milady's attire steadily diminish—comes this welcome return of the button to fashions favor once more. During the past two years the use of buttons, especially in women's coats, has decreased at an alarming rate. Last year the fair sex did away with buttoning almost entirely—holding their coats around them instead of making use of buttons. This season, however, buttons will once more occupy a prominent place in the decorative scheme of women's coats.

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LIST OF USEFUL BOOKS

Technology of Cellulose Esters, Vol. 1.

4083 pages in 5 parts

By E. C. Worden, 1920.

Illustrated, \$40.00.

It would require an entire issue of Plastics to adequately describe this work, which is the only complete bibliographic compilation of this art extant. Vol. I deals with Cellulose, Cotton, Sulfuric and Nitric Acid, mixed acids, the nitration of cellulose and stabilization of the cellulose nitrates.

Part 4 is a bibliography, carefully classified, giving all the published and patented uses of the various cellulose esters such as the nitrate, acetate, etc., as well as the cellulose ethers and substitutes for pyroxylin plastics.

Casein. Its Preparation, Chemistry and Technical Uses

E. L. Tague, 205 pp., \$3.00, 1926.

A comprehensive review of the casein industry. Reviewed in the present issue of Plastics, pp. 411.

Plastics and Molded Electrical Insulation.

Emile Hemming. 313 pages. Illustrated. \$6.00.

Very special care has been taken in the preparation of the chapter of molded insulation. Contains hundreds of references to plastic and composition products and their utilization.

Celluloid.

Its raw material, manufacture, properties and uses.

Dr. Fr. Bockmann. 188 pages. 69 illustrations. \$3.50.

In this book, the raw product, cellulose and its properties are thoroughly described. Other raw materials and methods of rendering them more plastic also occupy attention.

Pyroxylin Enamels and Lacquers.

Samuel P. Wilson. 213 pages. Illustrated. \$3.00.

An authoritative work dealing with the materials and manufacture of pyroxylin solutions and with their application in the industry.

Cellulose Ester Varnishes.

F. Sproxton. 1925. \$4.50.

An exceptionally well-written book on the general subject of the cellulose ester lacquers. Up-to-date and sufficiently non-technical to be of inestimable use to manufacturers.

Synthetic Resins and their Plastics.

Carleton Ellis. 514 pages, illustrated. \$8.00.

The book will serve as a guide and prove a stimulus to the numerous investigators and practitioners in the field of artificial resins. The section of plastic molding is especially valuable.

Any of the above can be obtained by writing to

Book Department PLASTICS

471 4th Ave., New York

Every plant or fabricating establishment needs all the books on the subject of its manufacture that it can obtain. Remember "Knowledge is power."



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